inasmuch as the general level of the roadway will be reduced 3 feet 6 inches in the centre, and proportionably at the approaches, which will thus eventually become much easier, and the steepness which is now so much felt and complained of will then be removed, or at least be greatly modified.—*Times, 23rd January.*

TO THE EDITOR OF "THE BUILDER."

SIR,—Having carefully examined the design of "A Practical Observer" in last week's number of your useful publication. I beg to observe that great credit is due to him for the proposal which he has submitted, as well for its elegance as for its stability; and it is to be observed that its practical construction rises above that of the design by Mr. Barry, whose pointed arches, though small, justly brought forth the strictures of Messrs. Walker and Burgess, they each having a tendency by their thrust to throw weight and resistance towards the adjoining arches, and as Messrs. W. and B. have asserted, should "one give way the rest must follow;" but the form selected by your correspondent removes this objection, by partaking of the properties of the ellipsis which concentrates the weight upon the piers. As your correspondent seems to have omitted the mention of this great advantage of his design, it deserves to be noticed.

I am, Sir, your obedient servant,
A CIVIL ENGINEER,
of the Great Western Railway.

SEWERS OF WESTMINSTER AND PART OF MIDDLESEX.

(*From a Correspondent.*)

AT a meeting of the ROYAL INSTITUTE OF BRITISH ARCHITECTS, held on Monday, the 22nd inst., Mr. Donaldson, V.P., who was in the chair, called the attention of the meeting to a recent examination, which had taken place at the Court of Sewers for Westminster, &c., of candidates for the new appointments of Assistant Surveyor and Clerk of the Works; out of above thirty candidates for the former appointment, only six were found efficient men, and not one of them was an architect or surveyor, but all were engineers. Mr. Donaldson, in alluding to the fact, impressed upon the minds of members of the rising generation the necessity of fully qualifying themselves for all the classes of appointments within the sphere of their professional practice. He inculcated the necessity of their studying mathematics, mechanics, and natural philosophy, in addition to the usual routine of the architect's office, as otherwise they would fall short of the requirements of the present age. If they wished to maintain their position they must not be merely equal to the expectations of society, but should be in advance of them.

The following are the questions which were submitted for solution to the candidates:—

For the situation of Assistant Surveyor.

1. What are the distinctive differences between Dorking Lime, Aberthaw or Blue Lias lime, and Sheppy cement, and the causes of those differences?

2. For what constructive purposes is each best adapted?

3. Which is the best process for slaking respectively Dorking lime and Aberthaw lime?

4. What is the best proportion of sand to these limes to make good mortar?

5. How is cement most beneficially used, whether with or without sand, or in what proportions?

6. Which are the best bricks to be used for the London sewers, in economical and practical points of view?

7. Which is the best form for the bottom of a sewer?

8. Which is the best mode of laying the bricks of the bottom of a sewer?

9. Imagine a trench which is to be cut for a sewer 25 feet deep, the upper 5 feet loose earth, the next 6 feet hard gravel, and the remaining 14 feet loose sand or silt, how should it be effected, what precautions should be taken, and how should the lower part of the sewer be laid in the running sand?

10. Imagine a sewer in an upper level, which is to be discharged laterally into one 18 feet lower, how should it be done? Give a sketch, plan, and section. The average depth of water in the upper sewer being 2 feet, and the horizontal distance from the end of this sewer to the side of the lower one 50 feet.

11. A sewer is to be carried through two streets 15 feet wide, the one with houses on one side only, the other with houses on both sides. Make sketches of the best mode of shoring up the houses. The trench required being 6 feet wide and 15 feet deep.

12. In what part of a column of water flowing down a sewer is the velocity the greatest, and where is it the least?

13. When two forces act on the same point in different directions, how can their equivalent be represented?

14. What is the difference between the angle of incidence and the angle of reflection?

15. What is the pressure of the atmosphere on a square inch?

16. Suppose a very flat district, at a distance from an outlet, to be drained so as to reduce the water in the district to be drained as low as possible, and to take the greatest advantage when the tide is down. The water free from deposit. Should the bottom of the new drain be level, or have a fall, and to what extent? State the reasons.

Valves.

17. What is the pressure upon a valve, 3 feet high and 2 feet wide, the top of which is 3 feet under the surface of the water,—and of a valve 2 feet high and 3 feet wide, under the like conditions?

18. What is the pressure of water on a circular valve 4 feet in diameter, the top being 5 feet under the surface of the water? What power would raise such a valve (sliding) supposing both the faces of iron? If of iron, what thickness would be sufficient? If of elm, what thickness?

19. Give the sketch of a valve and hinges for excluding the tidal water, the rise being 20 feet above the top of the valve.

20. What "by theory" is the velocity of water through a pipe, or other opening, 1 foot in diameter, the top of the opening being 3 feet 6 inches under the surface? What proportion of this ought to be deducted on account of friction, viscidity, &c.—1st, supposing an iron pipe—2nd, supposing a brick drain.

The Questions for solution by Candidates for the situation of *Clerk of the Works*, were the same as the first nine and the eleventh of the preceding series, together with the following:—

What is the strongest form for a drain, supposing it pressed equally in all directions?

12. Give the quantity and price of 20 feet run of a full-sized sewer, as per section given herewith, having a central granite keel stone to the invert, 9 inches deep, 8 inches wide at top, and 9½ inches wide at the bottom, instead of the central courses being in brickwork; the brickwork being valued, inclusive of all charges, at per rod 11*l.* 2*s.* 4*d.*, the granite to be valued according to its cubical quantity, at per foot cube 4*s.* 9½*d.*

13. Put the quantities and money to two bills for 20 feet run of sewer each, as per drawings Nos. 1 and 2.

P.S. The Candidates were required not to have any communication with each other, nor to leave the Court-house until they had delivered up to the Surveyor this paper, with their respective answers signed by themselves, and were allowed three hours for their solutions.

In the letter on Sewers by "An Old Commissioner," inserted in your paper of January 6, it was erroneously stated that a map was being prepared by Messrs. Milner and Braithwaite, which is not the case, as the map is in preparation for private purposes by Mr. Frederick Braithwaite, engineer, 1, Bath-place, New Road, who will no doubt be happy to forward a communication on the subject, should the Editor deem it interesting, when the map is complete. X.

London, Jan. 25th, 1844.

SUNDOP IMPROVEMENT.—In Lancaster, seventy-one new houses have just been completed, or are in the course of erection.

LIGHTNING-CONDUCTORS AT STRASBURG CATHEDRAL.—THEIR COST AND EFFECTS.

BY M. A. FARGEAUD.*

SCARCELY was Franklin's invention known in Europe, when the idea occurred at Strasburg of protecting the cathedral with a lightning-conductor. It was not, however, until 1780 that a definite proposition was made to the magistrates of the city by Barbier de Tinan, commissary of war. His project, which had been submitted to the examination of Franklin himself, was approved of, in all its details, by the Academy of Sciences. But this proposition was not followed out; the expense was feared.

Forty-seven years afterwards Professor Meunier recalled the attention of the authorities and the learned men of Strasburg to this subject; in his memoir he reverted to the visit which M. Gay-Lussac had just paid to the cathedral, and the wish which the illustrious academician had expressed, eventually to see this monument protected from the effects of lightning by a properly arranged conductor. An inconceivable opposition had just prevented the erection of a lightning-conductor on the theatre; the demand of M. Meunier was therefore ineffectual.

Such was the state of things when, on the 14th of August, 1833, about 4 P.M., a most violent storm burst over the city; the tower was struck three times within a single quarter of an hour; the third stroke illuminated almost the whole of the building for a few moments: the lead, the copper, the iron, the mortar, the very pavement itself, were burned or melted in several places; the hammers were soldered to several bells, and were not detached without considerable difficulty. The repairs, which this terrible explosion had rendered necessary, cost several thousand francs. Serious accidents might have attended the fall of the fragments of stone, which were driven even into the neighbouring streets. Destruction like this, and the fear which was its natural consequence, were more than sufficient to rouse anew the solicitude of the administration. A commission was named by the mayor, Frederick of Turckeim, to settle these three leading questions:—

1st. Is it right [*convenable* Fr.] to place the lightning-conductor on the tower of the cathedral?

2nd. What particular arrangements should be adopted in adjusting it?

3rd. What will be the expense?

This commission, which was organized two months after the event, was composed of MM. Lacombe, Husson, Voltz, Meunier, Herrenschneider, Fargeaud, and the architects, Spindler and Fries; it was proved by documents that for thirty years the mean expense for repairing the damage by lightning was 1,000 francs (forty-two guineas) per annum. But in the period preceding this, the existence of one part of the monument had been several times threatened. In 1759, for example, on the 27th of July, a lightning-flash burned all the woodwork of the roof of the church; the same year, in the month of October, the lightning struck the upper part of the tower three times during the same storm, and almost entirely destroyed one of the pillars of the lanthorn, &c.

I was instructed by my colleagues to draw out a summary of our discussions; my report was signed, and was addressed to the mayor, December 11th, 1833; the administration caused it to be printed, but they did not carry into effect the propositions which were laid down in it. Probably things would have once more remained in this condition, had not an explosion, more terrible even than that which we have just described, occurred on the 19th July in the following summer, most opportunely to call us to order. One of the four turrets was cut, as it were, through the middle; enormous stones were displaced; numerous fragments were transported to considerable distances: it was very evident that we ought to set to work, and so at last we did.

Our colleagues, to whom M. Diebold was joined, were desirous that M. Fries, the architect, and myself should undertake the details of the operation. Some modifications of the original project were easily adopted, and the apparatus was ready for action by the summer

* Translated by Charles Walker, Esq., for the *Electrical Magazine*.